THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888

No. 3. JANUARY 17, 1953 VOL. 65.

THE EFFECT OF VARIOUS FORMS OF FLUID REPLACEMENT DURING CIRCULATORY IMBALANCE IN THE DOG*

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PART I

The Effect of Infusions of Normal Saline Solution, Gelatine Solution and Protein Hydrolysate Solution on the Blood Pressure, etc., and the Survival Rate, in Conditions of Post-operative Shock

INTRODUCTION

Largely as a result of the discovery and production of cheap and effective antibiotics, the application of major surgery in veterinary practice has become a feasible proposition. Before this era, the mere fact that one was bringing a dirty and dusty animal into the operating theatre, and that for obvious reasons only a small area of the skin surrounding the operation site could be depilated and sterilised, would have made the result of the undertaking of operations in which a large amount of trauma is inflicted on tissues—such as occurs in bone pinning—a matter of conjecture.

Together with this increase in the field of surgical endeavour comes the greater possibility of the infliction of surgical shock. The latter condition may present as big a problem in the modern large-scale operation as sepsis did in older surgical ventures. This is especially so on account of the fact that the diagnosis of shock is a rather bigger problem and is not readily indicated as is the former, either by the clinical thermometer or the macroscopic formation of pus. Furthermore, shock tends to be a far more acutely fatal condition that will not respond to conservative treatment with palliative drugs or the scalpel.

The problem of shock is becoming an increasingly large factor in the pre- and post-operative treatment of subjects in the human hospital, where transfusion or infusion is still the treatment of choice.† Under veterinary conditions its importance may be even greater than in the human hospital. The human surgeon is a person who is chosen for his special ability in that field, and undergoes a prolonged and specialised training in the art and technique of surgery. This results in his actions becoming expert, and in the minimum of trauma being inflicted on tissues. The veterinary surgeon, on the other hand, is not necessarily a specialist in the surgical field, and functions less on account of his outstanding ability as a surgeon than that he is the only person available in the practice.

The possibility of surgical shock being caused through trauma being inflicted during an operation is, all other things being equal, far greater under veterinary conditions. On the other hand, the results of extensive trials undertaken on a substantial number of cases of surgical shock in the dog, indicate that the therapy of shock is a feasible proposition under practice conditions (Harthoorn, 1952b). It was also shown that the therapy of shock may readily be applied by the unaided general practitioner. In these trials the percentage of deaths in established cases of shock in the dog was reduced by therapy from 100 to 12 per cent. in a series of some 50 cases.

These investigations were prompted by observation of the lack of proper shock therapy in general practice, with consequent unnecessary loss of life. In general veterinary practice shock therapy is largely neglected. Moreover, when attempted, the counteraction or treatment of shock—as, for instance, by the infusion of saline solution—is, as revealed by controlled trials during these investigations, often either useless or actually contra-indicated.

In this paper, the attempted treatment of established "fatal" (*i.e.*, fatal if untreated) surgical shock with three different solutions is described. Identical cases of shock were used as controls. Some of these control animals were left untreated and others were infused with homologous plasma. These controls ensured (*a*) that the shocked animals on which trials of infusion materials were made were not in a condition from which they might recover spontaneously; (*b*) that the condition of shock that was being treated with infusion fluids was not irreversible.

TYPES OF FLUIDS USED FOR REPLACEMENT THERAPY

The fluids that are commonly used in the treatment of circulatory imbalance, hypotension and shock can generally be divided into two categories: crystalloids and colloids.

In the former group fall the electrolyte solutions such as normal (physiological) saline solution, Lock's solution, Tyrode's solution, Ringer or Ringer-lock, the so-called "artificial sera" (Hoitink, 1935), as well as other combinations of crystalloid fluids which at one time and another have been suggested as being advantageous in the therapy and prevention of shock. (Thaler, 1935; Cohn & Soskin, 1943; Katz, Friedberg & Asher, 1943; Tabor & Rosenthal, 1945; Fox, 1944; Wiggers & Ingraham, 1946.)

In the latter group may be placed whole blood, homologous plasma and serum, as well as artificial blood substitutes such as gum acacia (Hurwitz, 1917; Bayliss, 1916, 1918); pectin (Hartman *et al.*, 1937); isinglass (Taylor & Waters, 1941); gelatine (Hogan, 1915); haemoglobin solution,* (Amberson *et al.*, 1933, 1934), and dextran (Grönwall & Ingleman, 1944, 1945).

In the case of the first group, it appears from many reports on their use that, apart from small ameliorations that the contained ions may exert on some aspect of the shock syndrome, the general trend of their behaviour in the circulation follows the same laws as all other crystalloid solutions (Starling, 1896, 1899, 1909) in the living organism. Therefore a physiological solution of saline may be taken

* Based on a study of the therapy of post-operative shock in the dog, performed at the veterinary faculty of the university of Utrecht.

† A review of other treatments for shock is given elsewhere (Harthoorn, 1952a).

* For the purposes of this paper, haemoglobin solution has been classed as an artificial blood substitute.

as representative of the whole group. With regard to the group of artificial colloidal blood substitutes, even a cursory review on their use would be far too extensive to be given here, and is extensively given elsewhere.* The conclusion reached, however, after an extensive survey was that the above-mentioned blood substitutes as well as others which are less well known, such as polyvinal alcohol and methyl cellulose, have many proven disadvantages and dangers associated with their application, which militate against their use and which far outweigh any possible advantages attending their administration.

The only possible exception to this criterion was a solution of gelatine. This, according to some workers, lacked the disadvantages associated with the completely "foreign" blood substitutes. At the same time an oncotic pressure *in vivo* could be demonstrated which appeared to be at least as effective as that exerted by any of the other artificial blood substitutes. Among the more important reports on the use and results of infusions of gelatine solution for various conditions of blood loss, etc., may be mentioned those of Little & Dameron (1943), Waters (1941), Little & Wells (1942), Lawson & Rehm (1943), Robscheit-Robbins, Miller *et al.* (1944), Ely & Angelo (1943), Grodins (1943), Nicholl & Boucher (1945), Parkins, Cope, Riegel *et al.* (1943), Kleinberg, Remington *et al.* (1943). It was on a basis of these favourable reports on the therapy of circulatory imbalance with solutions of gelatine that this substance was chosen to represent the group of artificial colloids during the research into the possible therapy of shock with various types of readily available fluid, on which the observations reported in this paper are based.

One class of substance that does not come clearly under the heading of either crystalloid or colloid is that of the products of the breakdown of animal protein. The use of these digests of protein was first suggested by Henriques & Anderson (1913) for the purpose of the rapid counteraction of the results of malnutrition, and later again by Rose in 1934. Their use for the possible therapy of acute protein deficiencies such as apparently occur during haemorrhage and shock was first advanced by Elman. Elman suggested in 1942 "An entirely new approach to the problem of correcting protein deficiency by the use of building stones of protein, *i.e.*, amino acids or small aggregates thereof—polypeptides." Impetus to this work was lent by the finding that the administration of digests of protein apparently stimulated the formation of the albumin fraction of the plasma protein (Elman, 1948, 1950; Maddock, 1948).

Other work done on the parenteral administration of amino acids and hydrolysed protein was that of Elman (1940a, b, c); Elman, Sachar, Horwitz & Wolf (1942); Horwitz *et al.* (1942); Elman & Lischer (1943) and Nicholl, Boucher & Prince (1945).

Types of Fluids Used

The types of fluid used for replacement therapy during hypotension and shock, in the part of the investigations now under consideration, were :—

A physiological solution of sodium chloride (saline).

A solution (6 per cent.) of gelatine in a physiological solution of saline.

A protein hydrolysate.

The physiological solution of saline was prepared by dissolving pure sodium chloride crystals into distilled water to a concentration of 0·09 per cent. The resulting solution was rendered pyrogen free by the method of Nelson (1939). The solution was stored in the same flask in which it had been prepared.

The gelatine used in these investigations was one which had been prepared by the hydrolysis of alkali-treated bone collagen. The *p*H of the solution was adjusted at 7·3 (Little & Wells), sodium carbonate being used for the adjustment (Gordon *et al.*; Ivy *et al.*; Nicholl *et al.*; Little & Wells). The crystalloid solution used in the preparation was rendered pyrogen free (see above) and the final solution autoclaved for 15 minutes. The solution was prepared in bulk to minimise individual variations between different infusions.

The protein hydrolysate had been prepared from a digest of horse muscle which had been broken down by digestive enzymes in an acid medium to the stage of polypeptides and amino acids. The resulting solution was rendered free from bacteria by filtration, and stored in air-tight containers at room temperature.

Procedure

A critical comparison was made of the three classes of infusion fluid described above by giving infusions of either physiological saline, gelatine solution or protein hydrolysate to animals in a state of hypotension and shock. The results of these infusions were compared with those of infusions of homologous plasma. The latter was used as a standard, both to measure the effect of the infusions of artificial substitutes as well as to determine the reversibility of the depth of the shock that was being treated.

The animals that were treated (in nearly all cases dogs) were in a state of shock due to operative procedure. The degree of shock in each range of investigations was similar as judged from determinations of the blood pressure, the total circulating blood and plasma volume, hourly determinations of the plasma protein percentage and the haematocrit value, measurements of the central blood oxygen content and saturation and carbon-dioxide content, as well as half-hourly determinations of the pulse rate, respiratory frequency and depth, and rectal temperature. The exact methods are given elsewhere (Harthoorn, 1952c).

Therapy in all cases was instituted only after the animal had been allowed to remain in a state of hypotension for a space of two and a half hours. During this time careful observations were made to determine the presence of signs of spontaneous recovery. The withholding of treatment in an adequate number of controls in similar states of shock resulted in a mortality rate of 100 per cent.

In most series the treatment comprised an infusion of fluid amounting to 20 c.c. per kg. bodyweight, heated to the temperature of the animal at that time (a precaution that was probably superfluous—Rademaker, 1930; Thompson, 1933; Banks, 1934). The infusion was given over a time interval of 30 minutes. The femoral vein was used for the infusion in all cases.

As already stated, prior to the infusion all animals had been allowed to remain in a state of hypotension and kept under close observation during the space of two and a half hours. The blood pressure during this time was at shock level, *i.e.*, a mean of 70 mm. Hg compared to a normal height of 150 mm. Hg. In those animals whose blood pressure had been found to be either higher or lower than a mean height of 150 mm. Hg at the commencement of the operation, the shock level, or the level where the blood pressure would remain at a constant level of hypotension in the face of a progressive decline of the plasma volume, was usually found to vary in proportion.

During this time the surroundings in which the animals were kept were at a constant temperature (20° to 22° C.). Individual heating of the animals was not undertaken, on the

* Harthoorn, A. M. (1951). Unpublished report.

basis of reports on its detrimental effect (Wiggers, 1941 ; Rosenthal, 1942 ; Walton, 1944 ; Blalock & Mason, 1945).

The anaesthesia used in all cases was sodium pentobarbitone (nembutal, Abbott laboratories) given as an initial dose of 0·025 gramme per kg. bodyweight into the radial vein. This type of anaesthesia does not interfere with research on the circulation, plasma proteins and shock. (Ahlquist, 1949 ; Lewis, Page *et al.*, 1950 ; Remington, Hamilton *et al.*, 1950 ; Mylon, Winternitz & de Sütö-Nagy, 1942 ; Zweifach, Abell *et al.*, 1945 ; Mylon *et al.*, 1946.)

The Effect of Saline Infusion

The effect of an infusion of saline into the shocked animal was the same in all cases, irrespective of the fact that in some the shock was due to gross loss of blood, and in other cases due to completely different causes such as prolonged handling of the viscera following on laparotomy. This correlates with the observation reported elsewhere (Harthoorn, 1952a), that after a period of time had been allowed to elapse, following the induction of shock, and as the shock became more profound, the symptoms exhibited by the affected organisms became identical in the various groups. Thus it was observed that in an animal that had suffered a heavy loss of blood, the respirations would be increased both in rate and depth and the clotting-time of the blood would be decreased. As shock developed, the respiratory excursion would be seen to decrease while the clotting-time increased. After a period of one to two hours, it would not have been possible to determine, alone from the diagnostic criteria reported above, whether the shock was originally due to initial heavy blood loss, or due, for instance, to trauma.

The fact that the essential mechanism of shock was found to be similar, no matter in which way it had been induced, would raise the expectation that the general effect of the infusion of a particular substance into the blood stream would also be the same. It would thus tend to have the same effect in the treatment of the shock, independent of the fact that the shock may have been caused by any one of a large number of factors.

That this assumption proved to be correct may be seen from Fig. 1. This depicts the records of the blood pressures taken from three cases of shock which, although all three were due to the detriments which commonly occur during surgical procedure, were nevertheless originated by basically different causes. It will readily be seen that the result of an infusion of saline in each of these three cases resulted in an almost identical mechanical rise of the blood pressure during the process, followed by a rapid fall.

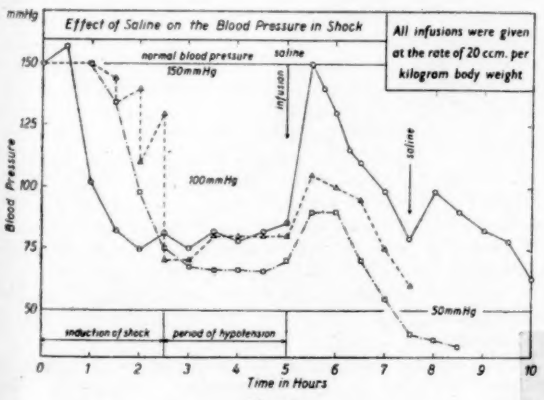

Fig. 1

The blood pressure tracings recorded in Fig. 1 were of those obtained from the infusion of a solution of physiological saline into animals in a state of shock, and a similar tracing may be seen in another two cases depicted in Fig. 3.

Immediately the infusion of saline was commenced, the animal would react by an amelioration of the shock symptoms. Not only would the blood pressure be raised in proportion to the severity of the shock and the depth of the blood pressure depression before infusion (Fig. 1) but the other symptoms of shock would also show a proportional decrease in severity. The pulse, which would often be imperceptible prior to infusion, became full and bounding. The respirations increased in frequency and in volume and the haematocrit reading, in the cases of the full infusion of 20 c.c. per kg. bodyweight, was lowered.

The most striking improvement in the condition of the recipient of an infusion of physiological saline was the alleviation of the depression of the central nervous system. This depression was so intense that the usual doses of anaesthetic would no longer be required as soon as shock became established. In those animals that developed shock and were left untreated in the capacity of controls, the regular doses of anaesthetic would not only be dispensed with with the advent of shock but would not even be needed for the whole of the subsequent survival period of the animal (often about 20 hours).*

In a matter of minutes, however, upon the commencement of infusion, these apparently deeply unconscious animals would become positive to stimuli, would often emit sounds and raise their heads. Some would move their limbs and show impatience at restraint. This extremely rapid recovery would suggest that the negative state was due largely to cerebral anoxia, as metabolism of the anaesthetic would not follow so soon after the re-establishment of the circulation. Neither is it likely that it can be ascribed solely to the dilution of the blood-anaesthetic-level due to the added fluid. If this were so, then there would be no reason to suppose that the fluid, when it again left the circulation (see below), would leave the soluble anaesthetic behind. Yet the unconscious state of the animal was as profound after the blood pressure had again fallen following the termination of the infusion as before it had been given.

Immediately after the infusion was completed, the blood pressure would show a renewed depression. As the blood pressure fell, so the temporarily alleviated symptoms of shock would reassert themselves. The animal would once again sink into that state of depression of the nervous system and unconsciousness from which it had just been aroused. *In all cases the blood pressure fell to a depth which was below that which would have been expected at that time if the condition had been left untreated*, as far as could be judged from the untreated controls. In most cases also the *remaining duration of the animal's life was shorter* after attempted therapy by an infusion of saline solution than that of the control animals which received no treatment.

Determinations of the haematocrit value at this time showed that the infused saline solution left the circulation rapidly and the reading soon assumed the pre-infusion level. This indicated that fluid equal in amount to the infused saline solution had left the circulation. Plasma protein determinations revealed, however, that some portion of the circulating protein present before infusion was apparently removed from the blood stream together with the escaping

* In those animals that recovered subsequent to infusions of plasma, repeated doses of anaesthetic were often given for many hours to enable the blood pressure to be registered so that the recovery pattern could be followed accurately.

fluid. It is this constant finding that may be associated with the damage that appears to be done to the vascular system by the infusion of substances, without effective oncotic pressure, into animals in a state of shock. The appreciable increase of the permeability of the blood vessel walls that results from this procedure will be further discussed later in this paper.

The Effect of Infusion of Gelatine Solution

In these investigations the infusion of the gelatine solution into dogs suffering from reversible shock was shown to have no ultimate advantage over similar infusions of normal saline solution. In the former as in the latter, the beneficial effect was shown to be extremely transient (see Fig. 2). The fall in the blood pressure after the cessation of an infusion of gelatine was a little less prompt. The blood pressure even showed a slight tendency to rise above the purely mechanical rise induced by the infusion. Soon after this slight improvement the blood pressure would show a rapid fall similar to that seen after infusions of saline solution. The survival period following the infusion of gelatine solution was no longer than that following saline.

The clinical improvement reported as a result of the infusion of saline seemed to be slightly less in evidence after a similar infusion of 6 per cent. gelatine solution. This supposed difference, however, was not sufficiently in evidence to be determined accurately, or to be reflected in demonstrable differences in the clinical symptoms.

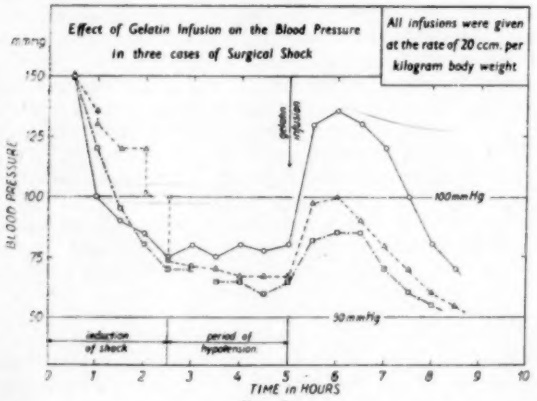

Fig 2

The gelatine solution was infused under identical circumstances and conditions as described above for saline therapy. The cases compared were, as far as could be determined by exhaustive examination, in an identical state of circulatory imbalance to (*a*) those treated with saline solution ; (*b*) those which survived following plasma therapy ; (*c*) the untreated controls ; (*d*) those receiving treatment with protein hydrolysate. On this basis, it can be seen that solutions of gelatine behaved in an almost identical manner to solutions of crystalloids.

At the same time, evidence was presented that both failed to maintain the blood pressure due to their rapid passage through the blood vessel walls (see above). The latter was also evident, both from the *post-mortem* distribution of extracellular fluids, and from the manifestation, immediately after infusion, that the T—1824 Evans blue dye which had been introduced into the blood stream for the purpose of determining the circulating blood volume, was washed into the interstitial tissues by infusions of gelatine and saline solution.

This phenomenon was not present after infusions of identical amounts of plasma. In the cases where the dye was washed out of the blood stream, it could readily be seen through the unpigmented parts of the skin of the recipient animal.

To digress for a moment into the realms of speculation: It would appear that the ability of a blood substitute to remain in the circulation cannot be predicted completely on a basis of its known molecular size, and that the blood vessels exert a certain and definite selectivity. Heuper (1940) states that the gelatine molecule has a molecular weight of 150,000 compared to the weight of serum albumin (72,000), which is ordinarily responsible for about 85 per cent. of the oncotic pressure of the blood (Elman, Lischer & Davey, 1942 ; Heyl, Gibson & Janeway, 1948 ; Janeway *et al.*, 1944 ; Scatchard, Batchelder & Brown, 1944 ; Thorn, Armstrong *et al.*, 1945). Yet the former is excreted by the normal kidney (Special Research Committee Report, 1944), and the latter is not (Bayliss *et al.*, 1933 ; Davis, Eaton & Williamson, 1942).

In the same way, free haemoglobin is also excreted by the kidney (Amberson *et al.*, 1934), although its molecule is neither smaller (Svedberg, 1930) nor larger (Cohn, 1925) than that of albumin. Pectin has a molecular weight of 150,000 (Heuper, 1942), yet it is not retained in the circulation (Ivy *et al.*, 1943).

When these reports are correlated with the findings reported in this paper, it may be concluded that the circulation does not recognise gelatine solution as a circulatory colloid. In spite of its molecular weight it does not appear to remain in the bounds of the circulation, nor does it exert an effective oncotic pressure *in vivo*.

The Effect of the Infusion of Protein Hydrolysate Solution

The result of the infusion of protein hydrolysate into the blood stream of animals in a state of shock differed from those of infusions of either saline or gelatine solution, in that the temporary improvement reported with the latter two was not evident after infusion of the protein digest.

The initial result of the infusion of the hydrolysate was a depression of the blood pressure from 20 to 30 mm. Hg in spite of the fact that all infusions were given slowly (20 c.c. per kg. bodyweight over 30 minutes). This reduction in the blood pressure, although it may not have been important in the healthy animal which was not suffering from hypotension, caused a grave deterioration in the condition of the shocked organism.

In one case the infusion was stopped when only one-third of the solution had been given, as the mean blood pressure had been depressed to 20 mm. Hg. In spite of this, death occurred within 30 minutes of the cessation of the infusion with symptoms of emesis. In two others the infusion had to be given over a much longer period than had been used for saline and gelatine infusions to allow the animal to compensate for the depression in the blood pressure. In neither of these two cases did the blood pressure recover to pre-infusion level before death. In other cases, in one of which the digest had been diluted with saline, the blood pressure rose eventually to only a little above the pre-infusion level, to fall again soon after the end of the infusion.

In all cases the death of the patient seems to have been accelerated as judged from the survival pattern of the untreated controls.

In no case was there any evidence of plasma protein regeneration.

Although in these investigations no benefit was found to

accrue from the infusion of protein hydrolysate as a therapy for shock, it must be pointed out that this does not mean that digests of protein may not be valuable aids to the re-synthesis of plasma proteins, if given either at a time when the circulation is not depressed or after it had been restored by suitable colloid or plasma therapy.* The liver is the organ which, according to Pelligrini (1928), Madden & Whipple (1940), and Whipple (1941), is responsible for the synthesis of the plasma albumin fraction. The finding of Blalock & Levy (1937) that the blood-flow through this organ is drastically curtailed during shock, would make it illogical to expect new plasma protein to be synthesised during a state of shock, unless the latter was at the same time relieved by other treatment.

General Considerations

The demonstration that neither physiological saline solution nor gelatine solution was of lasting benefit in the therapy of shock still leaves open the question as to whether these solutions may not be used as a temporary expedient in cases where other forms of therapy are not readily available. Another point that may be raised is that although it was shown that these solutions are of no lasting benefit in lethal shock, it has not been demonstrated that they may not have a salutary effect in sub-lethal forms of circulatory imbalance.

In respect of the former question, it has been shown during these investigations that it was not possible to use either saline or gelatine solution as temporary expedients in the therapy of shock. It was found (Fig. 3) that when a quantity of plasma was administered after the blood pressure had fallen subsequent to an infusion of gelatine or saline solution, the animal's life would not be preserved. The amount of plasma thus administered was amply sufficient to reverse the circulatory failure and to preserve life in those cases where it had been administered primarily.

As can be seen from Fig. 3, the blood pressure would rise as a result of the infusion of plasma after saline. This rise would be greatly in excess of that which was due to the mechanical effect of the bulk of the fluid alone. In spite of the raising of the blood pressure to a height well above shock level and one quite compatible with life, it would fall again during the following six hours or so, and the animals died in all cases.

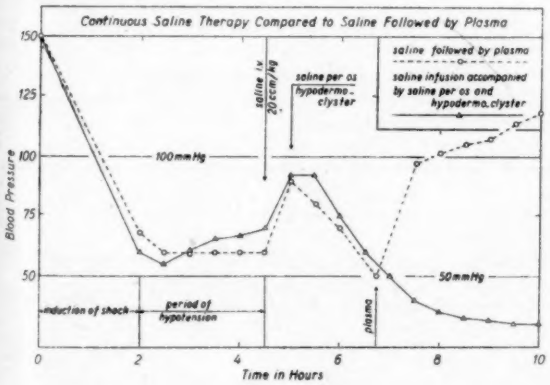

Fig. 3

* In this connection, it may not be out of place to mention here that in a small number of dogs the wound breakdown that was very prevalent after the alleviation of the acute hypoproteinaemia of shock by relatively very small quantities of plasma seemed to be discouraged by the "post-resuscitatory" administration of protein digest. However, the number of dogs subjected to this trial was insufficient to enable definite conclusions to be drawn.

The same result was obtained when the proven therapeutically effective colloid material was diluted with its own volume of saline, and administered as one infusion. This would show that the lack of result in the former cases was not due to the extra period of hypotension undergone by those animals that only received plasma when the blood pressure had fallen for the second time subsequent to being raised by saline infusion.

The fact that homologous plasma would no longer maintain the blood pressure after the administration of a quantity of a substance that is not able to remain in the circulation, would suggest that once an amount of fluid has been allowed to pass through the blood vessel walls, the permeability of those vessels is increased to such an extent that the normal plasma proteins are no longer kept within its boundaries.

In the case of the saline administered concurrently with the colloid, when the latter was given in a diluted form, it is feasible to assume that the excess saline present in the solution, *i.e.*, the crystalloid fluid in excess of the oncotic pressure of the colloid, was eliminated in a similar manner to the crystalloid fluid that is introduced into the blood stream alone. If this is correct, then we have the same ultimate condition as when the saline was administered prior to plasma therapy.

In the case depicted in Fig. 3, where saline only was given, a far greater quantity was administered than that in the basic series. Several other cases of established shock where large amounts of saline solution were given, either intermittently or as a continuous drip, were as unsuccessful in maintaining the blood pressure or in ensuring a maintained remission of the shock state as was the single infusion of 20 c.c. per kg. bodyweight.

It would be expedient in general practice if saline solution could be used in sub-lethal cases of impending shock or after large haemorrhages, especially as saline solutions are readily available and are inexpensive.

The difficulty in this respect, however, that would occur with the use of saline solution is that it is almost impossible to tell, even with the employment of far more diagnostic apparatus than is usually available in the veterinary surgery, which cases require definite resuscitation therapy, and which require only a little help in their normal physiological compensation. The findings reported in this paper showing the adverse effects of the infusion of saline solution into the shocked organism, and the readiness with which it converts reversible into irreversible shock, should make the surgeon extremely wary of giving large quantities of saline intravenously.

In subsidiary investigations employing intravenous colloid therapy it was found that saline solution which was introduced into the stomach, or which was injected as a hypodermoclyster, was not absorbed unless there was an *adequate colloid fraction in the circulating plasma to ensure its assimilation.*

It is therefore suggested that the administration of saline solution is a safe expedient as long as it is not injected into the blood stream. If the animal is in a state of shock, or has suffered profuse loss of blood, this form of therapy will be useless. It is not harmful, however, and will not preclude recourse to plasma or some efficient colloidal substitute when the condition of the patient continues to deteriorate.

Conclusions

Although gelatine solution has been shown by several workers to have beneficial results when administered after burns and haemorrhage, etc., it appears that when used as a treatment of established shock it is powerless to effect

more than a temporary and fleeting improvement in the blood pressure and the general condition. Apart from failing to maintain the circulation, infusion of gelatine solution was found to be contra-indicated in states of shock, in so far as with its failure to maintain the blood pressure it precluded the recourse to more successful lines of therapy such as homologous plasma infusion.

Protein hydrolysate solution was found to be incapable of re-establishing the circulation in cases of established shock. It is suspected, however, that while it has no indication in this capacity, it may fulfil a useful function when administered either before the possible advent of shock or after the circulation has been already re-established by other means.

Although saline solutions suffer from most of the disadvantages pertaining to solutions of gelatine, they have the advantage that they may be administered by other than vascular routes.

In this way they may be given by a route that does not cause direct harm and may be administered in dubious cases and in cases where more efficient fluids are not available.

Administered in this way, they do not preclude recourse to more efficient lines of therapy if these should prove necessary or if these should become available.

Summary

The effect of physiological saline solution, 6 per cent. gelatine solution as well as protein hydrolysate on the manifestations of shock and the survival rate of a number of dogs in a state of post-operative shock, has been demonstrated.

The use of physiological saline solution in general veterinary practice has been discussed.

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THE DEMONSTRATION OF THE PROTECTIVE VALUE OF A SWINE ERYSIPELAS VACCINE IN PIGS

BY

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Since most pigs are refractory to challenge with cultures of *Erysipelothrix rhusiopathiae*, it has generally proved impossible to test swine erysipelas vaccines in pigs under laboratory conditions. Moreover, tests of the efficacy of vaccines by means of field trials take several years to complete and may then be of doubtful significance. Fortner & Dinter (1944) described a test in which pigs, drawn from an area in which swine erysipelas was rare, were infected percutaneously by applying several strains of *E. rhusiopathiae* to skin scratches. A proportion of pigs treated in this way developed the severer forms of swine erysipelas while most developed erythematous lesions along some of the infected scratches. This method of challenge has been employed with success by several workers to test vaccines against swine erysipelas (*e.g.*, Traub, 1947; Dinter, 1948; Bakos, 1951). Other workers have not found it to be a useful method (Doyle, 1952). Doyle (1947) found that pigs which have been vaccinated against swine fever and had their immunity challenged by the injection of virulent swine fever virus, become highly susceptible to swine erysipelas and that pigs " prepared " in this way may be used for testing vaccines against swine erysipelas (Doyle, 1952).

We wished to determine whether pigs could be immunised against swine erysipelas by means of a formalised aluminium hydroxide adsorbed vaccine prepared by us and proved capable of immunising mice satisfactorily. The purpose of this paper is to report preliminary trials of this vaccine in pigs using the two types of test mentioned above.

Methods

Preparation of Vaccine.—Vaccines of the kind described by Traub (1947) were prepared by inactivating suitable growths of *E. rhusiopathiae* with solution of formaldehyde

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(*To be continued*)

and adsorbing the bacteria and soluble antigen to aluminium hydroxide, the general procedure following that of Gledhill (1952). Each batch of vaccine had been proved capable of immunising mice, the mouse test being carried out according to the method described by Gledhill (1952).

Vaccination of pigs.—Pigs aged four to five months were vaccinated with a single dose of vaccine injected subcutaneously behind the ear.

Challenge of pigs.—Cultures used for challenging pigs were maintained on serum agar slopes subcultured at seven-day intervals. For each test, subculture was made into tubes of serum broth medium and incubated overnight at 37° C. A further subculture into warmed medium in 100 ml. quantities, after six hours' incubation, provided the challenge culture. Tests were conducted as follows:—

(a) Method of Fortner and Dinter. Two scratches were made about 25 to 35 cm. long with a hypodermic needle on each flank of the pigs to be challenged. The scratches on one side were painted with sterile medium as a control, while those on the other side were painted with cultures of strain Ru and 253 respectively. The pigs were observed twice daily, their temperatures being recorded for several days before the commencement of the experiment and continued for 10 days thereafter. Results were assessed by the skin reactions observed 24 and 48 hours after inoculation and by the general symptoms of the animals.

(b) Method of Doyle. Pigs aged three to four months were vaccinated with crystal violet swine fever vaccine and inoculated with swine fever virus three weeks later. They regularly withstood this challenge. Pigs treated in this way are termed " prepared " pigs. After a further three weeks some were vaccinated against swine erysipelas and others left as controls. Four weeks later in one experiment, and 10 weeks later in another, vaccinated and control pigs were challenged with 2 ml. of a six-hour growth of *E. rhusiopathiae* injected in the gluteal muscles. The strain of organism used was that recovered from a " prepared " pig which had died of swine erysipelas as a result of inoculation with strains Ru and 253. This strain is designated Ru/253. Results were assessed on the occurrence and severity of symptoms of swine erysipelas.

Results

Experiment 1.—This was a preliminary observation to determine whether the application of the challenge cultures to scarified skin regularly produced a localised or generalised infection. Seven pigs were used in this experiment. Since Evans, Miles & Niven (1948) had noted the effect of adrenalin in enhancing local infections, two of the pigs were given a series of intradermal injections (0·005 ml. each) of 1:100 adrenalin 1 to 3 cm. apart along lines upon which the scratches were made some 30 minutes later.

One pig died of acute swine erysipelas on the fourth day following infection. Five showed considerable local erysipelas and moderate pyrexia, otherwise there was little sign of illness and recovery was complete in a few days. One pig remained completely normal. There was no indication that the pigs treated with adrenalin were more seriously affected, either locally or generally.

Experiment 2.—Six pigs were inoculated subcutaneously with 5 ml. of the vaccine. Three weeks later, together with six comparable unvaccinated pigs, they were challenged by scarification. None of the vaccinated pigs reacted locally or generally. Of the controls, two failed to react and the other four showed only slight local lesions.

Experiment 3.—Six pigs were inoculated subcutaneously with 1 ml. of vaccine and, together with six control pigs, were challenged by scarification three weeks after vaccination. The control pigs showed more reaction, both locally and generally, than in the previous experiment, whereas the vaccinated pigs showed no general symptoms and a slight local reaction was seen in only two pigs. The reactions 48 hours after infection, the time of greatest severity, are set out below:—

	Vaccinated		Unvaccinated	
	Local	General	Local	General
Pig 1	0	Nil	0	Nil
Pig 2	++	,,	+++	Slight
Pig 3	0	,,	++++	Marked
Pig 4	0	,,	0	Nil
Pig 5	+	,,	++++	Marked
Pig 6	0	,,	++	Marked

0 = no inflammation around scratches.
+, ++, +++, ++++ = area of inflammation extending 1, 2, 3 and 4 cm. respectively each side of scratches.

It would appear from these three experiments that scarification is not a reliable method of producing uniform reactions in the pigs used by us. On the other hand, in pigs which prove susceptible it is possible to demonstrate the influence of vaccination.

Experiment 4.—A group of 21 pigs were " prepared " and three weeks thereafter five of them were inoculated with 5 ml. of the swine erysipelas vaccine and 11 with 2 ml., the remaining five being left unvaccinated as controls. Four weeks later all were challenged with *E. rhusiopathiae*.

None of the 16 vaccinated pigs showed any local or general symptoms. In contrast, the five unvaccinated pigs reacted violently. Three were killed *in extremis*, two on the second and the other on the fifth day after challenge. The other two controls were severely affected but eventually recovered. In all five controls temperatures exceeding 107° F. were recorded and the symptoms were those of acute swine erysipelas. *E. rhusiopathiae* was recovered from the heart blood, liver, spleen and bone marrow of the three killed *in extremis*. It was also recovered from peripheral blood, taken at the height of the fever, from one of the pigs which survived, its recovery not being attempted in the other.

The high susceptibility of " prepared " pigs was further demonstrated by the spontaneous occurrence of acute swine erysipelas in three such pigs in pen contact with control pigs of this experiment. All developed the disease within 10 days of the appearance of symptoms in the challenged controls. Two died and the other was severely affected, recovering after treatment with swine erysipelas serum and penicillin. *E. rhusiopathiae* was isolated from the tissues of the dead pigs and from the blood of the pig which recovered. After recovery, this pig did not react to challenge with *E. rhusiopathiae*.

This experiment shows decisively that a single dose of vaccine immunises highly susceptible pigs to resist challenge with *E. rhusiopathiae* one month later.

Experiment 5.—Six " prepared " pigs inoculated with 2 ml. of vaccine, together with two unvaccinated " prepared " controls, were challenged with strain Ru/253 10 weeks later. None of the vaccinated pigs showed any signs of illness other than a transient febrile response apparent in only four. One of the controls was very

severely affected with typical acute swine erysipelas but eventually recovered. The other showed no local or general reaction. This pig had been in pen contact with the controls of the previous experiment when they reacted to challenge. Although it had shown no signs of illness then, it may have contracted sub-clinical infection and become immune. On the other hand, the vaccinated pigs and the control pig which reacted to challenge had not been exposed to pen contact with reacting pigs.

The evidence in this experiment strongly suggests that 10 weeks after vaccination with a single 2 ml. dose of the vaccine these pigs carried a good level of immunity. The transient febrile reaction seen in four of the six vaccinated pigs, no such reaction having been observed when challenge was at four weeks (Experiment 4), may be an indication that the level of immunity was on the wane.

Discussion

In observations designed to demonstrate the protective value of vaccination, it is a great advantage if the disease concerned can be reproduced in a typical form and with a high level of regularity in the species naturally affected. It is generally accepted that the injection of recently isolated mouse-virulent cultures of *E. rhusiopathiae* seldom produces even a local reaction in swine. This has been our experience. Fortner and Dinter attempted to overcome this difficulty by infecting with *E. rhusiopathiae* skin scratches on pigs specially obtained from an area believed free from swine erysipelas. In the majority of their pigs they were able to produce a local lesion which was fairly characteristic but true swine erysipelas occurred much less frequently. Doyle has shown that pigs vaccinated with swine fever crystal violet vaccine become highly susceptible to swine erysipelas after their immunity to swine fever has been challenged by the injection of virulent swine fever virus. Pigs so " prepared " develop typical acute swine erysipelas following the intramuscular injection of *E. rhusiopathiae*. In our hands the Fortner and Dinter method has proved unsatisfactory in that even local lesions were irregular in occurrence and in severity. On the other hand, pigs " prepared " as Doyle suggested have, with one exception for which there is a probable explanation, developed acute swine erysipelas following challenge with *E. rhusiopathiae*.

If, in the demonstration of the protective value of the formalised aluminium hydroxide adsorbed vaccine under test, one had had to depend on the Fortner and Dinter method, little more than suggestive evidence would have been obtained. On the other hand, using " prepared " pigs and challenging them by intramuscular injection of culture, it was clear that a single dose of this vaccine gave a high level of protection of at least 10 weeks' duration.

Summary

1. The protective value of a formalised aluminium hydroxide adsorbed swine erysipelas vaccine was demonstrated by challenging vaccinated and unvaccinated pigs.

2. Challenge by the application of culture to lines scarified in the skin proved unsatisfactory but the observations in one experiment indicated that this vaccine had a protective value.

3. Pigs vaccinated with swine fever crystal violet vaccine and thereafter challenged with virulent swine fever virus developed acute swine erysipelas following the intramuscular injection of *E. rhusiopathiae*.

4. Pigs so " prepared " were protected against swine erysipelas by the injection of a single dose of this vaccine. The duration of immunity was at least 10 weeks.

Acknowledgments.—We wish to thank Dr. R. F. Montgomerie, F.R.C.V.S., for his advice during the course of this work and Mr. T. M. Doyle, F.R.C.V.S., D.V.S.M., of the Ministry of Agriculture, Veterinary Laboratory, Weybridge, for supplies of swine fever vaccine and virus.

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CLINICAL COMMUNICATION

AMPUTATION OF THE RECTUM OF THE DOG

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Hampton

Prolapse of the rectum in puppies of four to five months of age is sometimes met with in this animal hospital. As a rule, complete eversion of the bowel with prolapse of the rectal muscle has resulted in gross contamination, and amputation presents the only remedy. At first sight the puppy may appear to be a bad surgical risk as it is generally poorly nourished and often parasitised. If, however, one eliminates the para-distemper cases right away, there is every reason to expect a successful outcome if surgery is undertaken in the others. Barbiturate anaesthesia is very safe even in debilitated young animals where slow administration of the chosen drug is strictly carried out.

The technique of amputating the rectum by suturing close to the anus on to a metal sound inserted into the lumen of the bowel is one of the original methods of dealing with this prolapse. More recently we have tried out a method reported by an American veterinary surgeon who was following a surgical technique explained in 1935 by Bayer, Moller & Frick in Berlin.*

The subject was an Alsatian puppy, aged four months, in poor condition. There was a prolapse of rectum and colon extending to about 3½ inches, and the bowel was lacerated. Sterile drapes were placed and gentle traction was applied to the rectum. At a distance of ½ inch from the anus two sutures of No. 3/0 chromic catgut were passed at right angles through the bowel (Fig. 1.). These sutures served to anchor the bowel while the remainder of the prolapsed portion was amputated about ⅛ inch farther down. Bleeding vessels were picked up and ligatured.

The right-angled through and through sutures now were grasped with forceps within the lumen of the bowel, pulled out and cut, thus forming four interrupted sutures. They were tied off (Fig. 2), leaving long ends to retract the bowel while interrupted catgut sutures were placed between them to unite the cut edges of the incised colon. When this was satisfactorily closed the four stay sutures were cut short and the stump was replaced.

*Surgery of the Rectum. Dinsmore. *North American Veterinarian*, May, 1952. Page 327.

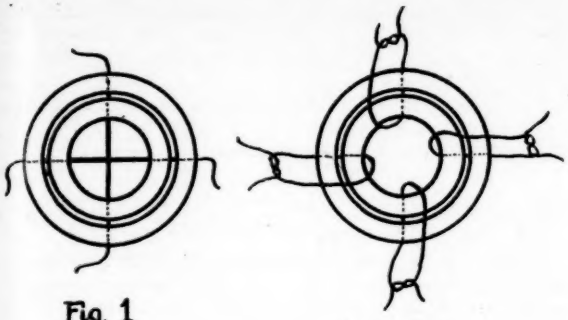

Fig. 1

Fig. 2

Two anchoring sutures passed through the lumen of the bowel.

Sutures pulled out and cut, forming four interrupted sutures.

Post-operative treatment included injections of penicillin. No solid food was given for five days, the puppy being kept on a milk diet. The anal region was kept scrupulously clean by constant attention. After 36 hours there was discomfort, with frequent attempts at defaecation. Morphia (1 grain) was administered twice. Fortunately, straining was not severe enough to bring the bowel down, and the puppy went on to recover uneventfully.

This technique of amputation is simple and neat, and can be recommended in cases where surgery is decided upon.

REVIEWS

[Textbook of Meat Inspection. By H. THORNTON, B.V.SC., M.R.C.V.S., D.V.H. (Second edition.) Pp. vi+646, four colour plates and 260 other illustrations. Baillière, Tindall & Cox, 7 and 8, Henrietta Street, London, W.C.2. Price 55s.]

When reviewing the first edition of this book we concluded by saying "This is a good book—a very good book—and both the author and publishers are to be congratulated on producing what will undoubtedly be acclaimed the most authoritative text-book on meat inspection so far issued in this country." The immediate, and sustained, popularity of this work has fully justified this opinion and the book is now well established as a standard work.

Although the first edition was relatively free from errors which always seem to accompany such initial efforts, this new edition rectifies many of these and some sections have been revised in the light of newly acquired knowledge. Examples are: the physical and chemical properties of voluntary muscle and the explanation that "black beef" is not the result of imperfect bleeding but the manifestation of a chemical change due to lack of sufficient glycogen in the muscles at the time of slaughter; the evidence that in bone taint the putrefactive process commences in the bone marrow and that the causal organisms are actually present *ante-mortem* and do not gain entrance to the body after death, as formerly was supposed. The section on leukaemia has been rewritten and attention drawn to the characteristic lesions, particularly of the lymph nodes, which may be encountered in cattle slaughtered while affected with this condition. With regard to salmonella organisms, it is pointed out that stress should be laid on the importance of debilitating factors affecting the clinically healthy animal which may harbour these organisms in its intestines. Reference is made to their survival in the house-fly and the possibility of infection due to the contamination of food by the faeces of infected rat fleas and cockroaches.

The replacement of a number of the original illustrations and the addition of new ones have enhanced the value of the work materially.

* * * * *

[Improving the World's Grasslands. FAO Agricultural Studies, No. 16. An FAO study prepared by A. T. Semple, Agricultural Officer, Animal Production Branch, Agriculture Division. Printed in Great Britain at The University Press, Aberdeen.]

This study draws attention to the pre-eminence of grass as the most important agricultural crop not only in this country but throughout the world. It is compiled by contributors, a list of which includes men of great experience throughout the world. In a very small handbook grassland problems of many countries have been dealt with and their relationship to the stock grazing the grassland is discussed.

A great feature of the book is that each section includes details of publications for further reading.

This book should be read by all who have an interest in the problems of grassland development not only in this country but throughout the world.

* * * * *

The Economic Importance of Disease in Livestock

The veterinary profession knows that health is a primary requirement in any efficient and profitable livestock industry. Outside the profession that axiom does not appear to be appreciated properly.

A perusal of the agricultural Press would leave an impartial observer with a very strong impression that such factors as labour costs, feeding costs, mechanisation, fertilisers, artificial insemination and genetics, etc., were of much greater interest and therefore, presumably, of much greater financial importance to the farmer than the state of health of the livestock which are the basis of the cattle, sheep and pig industries. Such a view seems also to be shared by those who are charged with the direction of research into agricultural problems and with the diffusion of the results of such research. The reasonableness of this statement as an interpretation of the outlook of the authorities may be seen by a consideration of the allocation of manpower and funds for research and extension work.

Very interesting light on this matter is contained in a bulletin, No. 548, of some 60 pages published by the University of Illinois Agricultural Experiment Station in December, 1951. This is entitled "Livestock Earnings on North-Central Illinois Farms. An analysis of factors affecting them." It is edited by M. L. Mosher, Professor of Farm Management, and is based on records of 271 farms over a period of 10 years from 1936 to 1945. These records were kept by farmers in co-operation with the Farm-Bureau Farm-Management Service. It is of interest to note that no veterinarians are mentioned among those responsible for the work, which was carried out by the Department of Agricultural Economics, the records of the farmers being supervised by fieldmen trained in farm management who spend their whole time with the farmers. That being so, one may assume that the findings of this study are free from any veterinary bias.

The object of the work was to answer the question: "Why does livestock on some farms earn more than that on similar farms in the same area?" In the area where the work was done pigs are the most numerous of farm livestock and sheep the least. Some of the farms are predominantly grain producing, others are mixed grain and livestock and about half are mainly livestock farms. The disease situation in Illinois is possibly rather more favourable than it is in Great Britain. Bovine tuberculosis is almost non-existent, foot-and-mouth disease has not occurred for over 20 years, the virulent or so-called Asiatic form of Newcastle disease is not present. Such diseases as brucellosis, Johne's disease and mastitis are probably at much the same level as in Great Britain, while swine fever and the mild form of Newcastle disease may be rather more prevalent. On the whole the disease situation cannot be very widely different from that with which we are acquainted in this country.

The measure of livestock efficiency which was used was the "returns per 100 dollars' worth of feed fed." Factors taken into consideration in assessing efficiency included such things as milk yields, food costs, labour, size of herd or flock, bodyweights at time of sale and so on, and these are analysed and correlated with the financial results of the farm as a whole.

In the Bulletin, cattle—subdivided into feeder cattle; beef breeding herds; dual purpose herds; dairy herds—pigs; sheep and poultry are each considered separately. The following quotations are taken from the various sections.

Pigs.—"As a measure of efficiency, death loss after weaning is closely related to the number of pigs weaned per litter; farmers weaning large litters also had small death losses after weaning. Both factors indicate that *one of the most important reasons why some farmers make more money than others with their hogs is that they keep their hogs healthier*"; also,

"Keeping hogs healthy so as to wean large litters, avoid death losses and make rapid gains was shown to be of the greatest importance in getting profits from hogs."

Feeder Cattle.—"High death losses, low profits"; also,

"In the seven herds with the highest returns on feed the death loss was only 70 per cent. as great as in the seven with the lowest returns."

Beef Breeding Herds.—"Low death losses were more closely related to high earnings per 100 dollars' worth of feed fed than *any other factor studied*."

Dairy Cattle.—"Low death losses in the dairy herd were very closely related to high earnings. *No other dairy cattle factor was so closely related to high nett farm earnings*."

Sheep.—"The high-return flocks suffered only about half as heavy death losses as the low-return flocks."

Poultry.—Curiously, in this section there is no mention whatever of disease or mortality. Can it be that, as in some poultry farms in this country, the poultry farmers claim that no fowls ever die on their farms since they cull and market immediately any bird which shows the slightest departure from health?

These few quotations will be sufficient to indicate that good health of the stock is the basic essential in profitable animal husbandry.

At first reading one experienced a little difficulty in believing that death losses would make such important differences in the profitability of the various farms. However, it is not the actual monetary value of the dead animals which is considered here. Deaths are used as an index, the only accurately *measurable* index, of the state of health of the herd or flock. It is reasonable to assume, for example, that the "deaths" in a litter of pigs will reflect the state of "health" of the litter better than any other readily measurable index. If one picks out the herds or flocks with a high death-rate one has picked out the unhealthy ones. It was the "unhealthy" state of the animals, not only the "deaths," which accounted for the poorer financial returns.

The Bulletin is full of important information and many useful tables, and is well worthy of study by all concerned with agriculture in these islands.

* * * * *

[Herdsmanship. By NEWMAN TURNER. Faber & Faber, Ltd., 24, Russell Square, London. Price 18s.]

The only interest this book has for the veterinary surgeon is to make him aware of the very extravagant claims made by the author in this eulogy of himself and his methods, particularly those concerning disease control, prevention, and treatment by compost grown crops, by garlic and a few other herbs, and by varying periods of starvation of the cow up to one week or longer "if it appears to be in good condition at the end of seven days." The methods have secured at least a few adherents whose experiences are quoted.

The book discloses that the author has a marked lack of fundamental knowledge of veterinary science but he does not hesitate to state his ability to reclaim reactors and cure tuberculosis, to give "permanent immunity" to Johne's disease and other so-called "virus-transmitted diseases," and to cure sterility and mastitis, "by simple herbal adjustments and a regime of organically grown food." He is bitterly critical of the Ministry of Agriculture for ignoring his claims in respect of foot-and-mouth disease.

The animal husbandry section of the book contains nothing that cannot be found in any of the many books written on the subject, other than the author's unorthodox methods and beliefs with which it is freely interspersed and which make it less valuable in consequence.

* * * * *

"*Fundamentals of the Histology of Domestic Animals.*"—In our issue of January 3rd it was stated in a review of the "Fundamentals of the Histology of Domestic Animals" that this book was written by R. E. Habel and E. L. Biberstein, whereas the authors' names are Alfred Trautmann, Professor of Veterinary Medicine at the Veterinary School in Hanover, and Josef Fiebiger, Professor of Veterinary Medicine at the Veterinary School in Vienna. The name of the publishers, Baillière, Tindall & Cox, was correctly given, but the printer's name was also included, in error.

FARMERS' FIRST LIVERY DINNER

An historic event in the corporate life of the agricultural community of this country was celebrated at the Mansion House, London, on January 7th, when the Rt. Hon. Lord Courthope, Master, presided over the first Livery Dinner held by the Worshipful Company of Farmers, to meet the Rt. Hon. the Lord Mayor (Alderman Sir Rupert de la Bere, M.P.) and the City Sheriffs. Mr. Victor Parker (Junior Warden) proposed the toast to the Lord Mayor, Sheriffs and Corporation and that to "The Company of Farmers" was proposed by the Duke of Norfolk. Sir Richard Haddon (Senior Warden) gave "The Guests," response being made by the former Lord Chancellor (Earl Jowitt). The membership of the Worshipful Company embraces several veterinary surgeons, including Mr. Geo. N. Gould (who is also a member of the Court), Mr. John Hodgman and Dr. W. R. Wooldridge.

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UNIVERSITY OF LONDON EXAMINATIONS IN VETERINARY SCIENCE

In the First Examination (December, 1952) Bin Din Osman, of the Royal Veterinary College, was successful, Richard Martin Newey (Higher School candidate) completing exemption. Brian Keith Fenton, of the Royal Veterinary College, passed the Second Examination.

QUESTIONS AND ANSWERS

The submission of questions for inclusion in this column will be welcomed; they can relate to any aspect of veterinary work, but must be of a general nature—questions cannot be considered in which information is sought regarding diagnosis or treatment of specific cases, nor for which solely a private reply is desired. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Nymphomania in Mares

Q. 420.—*Repeated injections of luteinising hormone have been found beneficial in the treatment of this condition in certain cases. Is it possible to use an implant to prolong the treatment and, if so, which preparation ?*

A.—This is a condition which should be considered under several different types of behaviour.

(1) Continual or long oestrous periods, in which the mare shows typical symptoms of oestrus.

(2) Stallion-like behaviour, when the mare shows male characteristics, including mounting other mares.

(3) Spiteful behaviour, swishing of the tail, frequently showing clitoris, and an irritable disposition.

(1) and (2). Invariably these are due to some abnormal condition of ovaries, either temporary or permanent, but which in many cases is itself an expression of abnormal levels of hormone secretions controlling the oestrous cycle.

(3) This behaviour is seldom related to ovarian troubles.

Causes

(1) In this type nymphomania is usually due to temporary derangement of the oestrous cycle, but can also be caused by cystic ovaries, or by the early stages of a unilateral ovarian tumour.

(2) Invariably due to a unilateral ovarian tumour.

(3) Ovaries and oestrous cycle are usually quite normal, and it is entirely a question of temperament.

Treatment

If due to ovarian tumour, removal of the affected ovary.

If due to slow development of ovarian follicle, luteinising hormone intravenously to induce ovulation.

Cystic ovaries should be punctured; usually, this treatment must be followed by luteinising hormone intravenously to induce ovulation following subsequent follicle development.

Implantation.—Implantation of stilboestrol can be used to force ovaries into an anoestrous condition; with implantation of a 1 gramme tablet, ovaries become very small, and all follicle development is arrested. During the period of the implant mares show stallion-like behaviour in the presence of other mares.

This treatment is also useful in reducing ovarian tumours to a size which enables ovariotomy to be carried out via the vagina.

The questions have been answered from the breeding aspect.

The writer has no experience worth recording of other types of implants, nor of implants of stilboestrol with riding animals, and for that reason would point out that implants of stilboestrol in cows cause slackening of the sacro-sciatic ligaments with consequent increased incidence of pelvic fractures; also that in rams they cause relaxation of inguinal rings with a high incidence of scrotal hernia—although the many implants given to breeding mares have never suggested any such changes.

Johne's Disease and Copper Deficiency

Q. 421.—*In view of the varied interpretations given on similar samples of bovine faeces, in connection with Johne's disease, and the fact that many of these cases respond to dosing with copper, even when a sample is positive, to the extent of putting on weight again and in many cases breeding again, can you tell me whether there is any connection between the incidence of Johne's disease and copper deficiency in a herd or on a particular farm ?*

A.—Absolute copper deficiency is extremely rare in this country, but it is a well-established fact that Johne's disease is widely distributed on all types of soil and under different conditions of management; any connection, therefore, between Johne's disease and copper deficiency would appear to be somewhat obscure.

The writer is not aware that "dosing with copper" will so affect cattle with "positive Johne" faeces as to enable them to breed and put on weight again, although feeding with "minerals" was advocated many years ago as a treatment for Johne's disease; the method, however, has generally been discredited. It is well known that the diarrhoea associated with the disease can be temporarily controlled with astringents; on the other hand, the only type of diarrhoea likely to be specifically affected by copper is that associated with molybdenum poisoning such as occurs on "teart" pasture, but no doubt this factor already has been recognised.

From the point of view of herd management your correspondent should seriously consider the implications involved in breeding from cows known to be affected with Johne's disease.

Spasmophilia and Tetany

Q. 422.—*Can you explain the difference between spasmophilia and tetany ?*

A.—The terms spasmophilia and tetany have been used to describe syndromes which are often similar in most essential clinical signs, *e.g.*, grass or lactation tetany of cattle and sheep; and spasmophilia of calves (Quin, 1941), although in the latter convulsions were present. Scott & Brownlow (1935) define spasmophilia as a morbid tendency to convulsions, and tetany as a disease characterised by intermittent, bilateral, painful, tonic spasms of the muscles. However, the distinction based on the presence or absence of convulsions is not always accepted, and Best & Taylor (1945) use the term spasmophilia to describe forms of tetany in which persistent hypertonic spasm of certain muscles, *e.g.*, of the larynx causing closure of the glottis, occurs. In veterinary practice syndromes in which tetany and related disturbances of muscle tone are accompanied by convulsions with gross disturbances of consciousness, have been called spasmophilia, but often the precise meaning of the term is not clear; the use of the word is apt to be confusing unless full details of the disturbances of muscular and nervous function are given, and the meaning to be attached to the term spasmophilia defined carefully.

References

Best, C. H., & Taylor, N. B. (1945). *The Physiological Basis of Medical Practice*, 4th Ed. London: Baillière.

Quin, A. H. (1941). *N. Amer. Vet.* **22.** 290.

Scott, R. J. E., & Brownlow, C. V. (1935). *Gould's Medical Dictionary*, 4th Rev. Ed. Philadelphia: Blakiston.

NOTES AND NEWS

Diary of Events

Jan. 17th.—Meeting of the Biochemical Society, King's College, Strand, W.C.2, 10.30 a.m.

Jan. 21st.—Meeting of the South-Eastern Division, B.V.A., at Maidstone (Royal Star Hotel), 2.30 p.m.

Jan. 21st.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at 1, Wimpole Street, W.1, 5 p.m.

Jan. 22nd.—Annual General Meeting of the North of Ireland Division, B.V.A., followed by a joint meeting with the Ulster Medical Society, at the Whitla Medical Institute College Square North, Belfast, 7 p.m.

Jan. 23rd.—Annual General Meeting of the Mid-West Division, B.V.A., at Clifton, Bristol (The Berkeley Café), 2.15 p.m.

Jan. 29th.—Meeting of the Western Counties Division, B.V.A., at Exeter (Imperial Hotel), 2 p.m.

Jan. 30th.—Meeting of the Lincolnshire and District Division, B.V.A., at Lincoln (Saracen's Head Hotel), 2.15 p.m.

Feb. 3rd.—Meeting of the Southern Counties Division, B.V.A., at Southampton (Polygon Hotel), 6.30 p.m.

Feb. 7th.—North of Scotland Division, B.V.A.: Winter Meeting and Annual Dinner at Aberdeen (Marcliffe Hotel, Queen's Terrace), 3 p.m.

Feb. 12th.—Annual Ball of Glasgow University Veterinary Medical Association, to be held at the Rhul, Sauchiehall Street, Glasgow, from 8 p.m. to 2 a.m.

Feb. 12th.—Royal (Dick) School of Veterinary Studies Annual Ball, at the Assembly Rooms, George Street, Edinburgh.

Feb. 27th.—Annual Ball of the Veterinary Society, Faculty of Veterinary Science, The University, Liverpool, to be held in the Students' Union from 8.0 p.m. to 2.0 a.m.

Council and Committee Meetings of the B.V.A.

The following arrangements for the Council and Committee meetings of the B.V.A. in April and July, 1953, have been made by Council B.V.A.:—

April 29th, 30th and May 1st in Edinburgh.
July 29th, 30th and 31st in London.

R.C.V.S. Council and Committee Meetings

The next series of meetings will be held in London on February 4th, 5th and 6th (Council).

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PERSONAL

Animal Health Trust Appointments

Farm Livestock Research Station.—To this station, the work of which has been expanded through the provision of new laboratories and equipment—due in large part to the generosity of Mr. J. Arthur Rank—an additional Senior Scientific Officer has been appointed in Mr. K. G. Morgan, M.R.C.V.S., who was first chief assistant to Mr. G. N. Gould, M.R.C.V.S., of Southampton, and later built up a large practice of his own in Exeter.

Mr. Morgan, who has become Field Officer to the station, graduated from the London College in 1943 during which year he was awarded the Silver Medal Clinical Prize. His experience has included a great deal of consultative work and operative surgery and while practising in Devon he was responsible for a course of veterinary lectures and examinations at the Devon Farm Institute. Part of his new duties will consist of visiting farms and consulting with veterinary surgeons.

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Equine Research Station.—Mr. E. J. Roberts, M.R.C.V.S., has been appointed as Scientific Officer His main work will be in experimental surgery, including the application of X-ray, electrocardiography and similar techniques. Mr. Roberts, who graduated in 1942, was a Lecturer in Surgery at the Royal Veterinary College 1950-52 and while there inaugurated a clinical photographic unit to provide coloured films and a pictorial library of clinical cases as an adjunct to the course of surgery provided by the veterinary schools. His films were presented at the British Veterinary Association Congress in 1951 and 1952 and at Berne in 1952. Another new appointment at the station is that of Mr. Desmond Poynter, B.SC., who will act as Parasitologist. His duties will consist of research work and work of an applied nature concerning the general subject of equine parasitology with special emphasis on helminthological problems in horses.

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Canine Research Station.—Miss M. E. Davies, B.SC., who has been appointed Bacteriologist at this station, graduated at Edinburgh University in 1942 and took her Honours Degree in Bacteriology in 1946. Later she worked in the Post-Graduate Medical School, London, from 1948 to 1952.

Poultry Research Station.—A recent appointment at this station is that of Mr. L. G. Chubb, B.SC., who will be concerned with nutritional and biochemical problems. Mr. Chubb, who graduated at the University of London in 1949, took Honours in Zoology in his final B.Sc. examination. He has previously undertaken research into a number of problems of interest to poultry farmers and breeders. These include the nutritive value of proteins of vegetable and animal origin, the value of various antibiotics as supplements in poultry rations, the efficacy of various animal protein factor concentrates and vitamin B_{12} in all-vegetable starting, growing and laying rations and the growth stimulating effect of surface-active agents in young chicks.

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Fellowship Award

The Poultry Research Station announces also the award of a Fellowship for a period of two years to Miss D. M. Cooper, B.SC. Her work will be mainly in connection with the present study of fowl observations which is being carried out under the supervision of Dr. R. F. Gordon, M.R.C.V.S., the station's Director. Miss Cooper, who graduated as a B.Sc. in Agriculture at the University of British Columbia, worked for a time under Professor J. Biely, in the Department of Poultry Husbandry at that University. More recently, she worked at the Branch Laboratory of the Division of Animal Pathology of the Canadian Science Service Department, being concerned mainly with the testing of Newcastle disease vaccines and the carrying out of virus diagnostic tests for this disease.

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Mr. E. C. Hulse, B.SC., M.R.C.V.S., having completed his period of service with the World Health Organisation in Geneva, has resumed his duties as Senior Research Officer at the Veterinary Laboratory of the Ministry of Agriculture, Weybridge.

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Births.—Burke.—On January 1st, 1953, to Jean, wife of N. F. S. Burke, M.R.C.V.S., Mill Cottage, Oxted, Surrey, a daughter—Ann Frances.

Builder.—On January 3rd, 1953, at Brixham Hospital, to Christine, wife of Peter Builder, a daughter.

Howard.—On January 9th, 1953, at 18, Station Road, Ely, to Celia and John Howard, M.S.R.C.V.S., a sister for Anthony—Jennifer Elizabeth.

Sutton.—On December 27th, 1952, to Heather (*née* Streeter) and Peter Sutton, M.S.R.C.V.S., of Tunbridge Wells, a son.

Thonger.—On November 26th, 1952, to Eileen (*née* Paterson) and Harold Thonger, M.R.C.V.S., of Tunbridge Wells, a son.

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Marriage.—Mitchell—Maclachlan.—On January 6th, 1953, at Dean Church, Edinburgh, Ken Seymour Mitchell, M.R.C.V.S., only son of Mr. and Mrs. H. G. Mitchell, Burtland, Pendre, Brecon, South Wales, to Sheila M. C. Maclachlan, M.A., second daughter of the late Alistair and Mrs. Eleanor Maclachlan, 17, Craiglea Drive, Edinburgh.

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Presentation to Mr. Keri Jones.—In its issue of January 3rd the *Somerset County Herald*, reporting the transference to Breconshire of Mr. Keri Jones, B.SC., M.R.C.V.S., who has been one of the Ministry's Veterinary Officers in Somerset for the past 10 years, says that he will be much missed by the numerous friends he made during his stay in Somerset. He did much good work in encouraging the activities of Young Farmers' Clubs in the area, and was much sought after as a speaker at Young Farmers' and N.F.U. meetings.

At Glastonbury Mr. Jones was a prominent member of the Operatic Society, and did valuable work as a member of the Rotary Club of Glastonbury and Street. At a meeting of the club on Christmas eve the President, Rotarian L. E. Green, thanked Rotarian Jones not only for his practical services to Rotary, in particular for acting as speakers' secretary for 12 months, but for the way in which he had added to the fellowship of the club. The President said that while the members were sorry to lose Rotarian Jones they rejoiced with him that his transfer to his native hills was in the nature of promotion. Rotarian Keri Jones was then handed a fountain-pen as a gift from the members.

Mr. Jones said how much he had enjoyed and appreciated the privilege of being a member of the Rotary movement, and how sorry he was to have to sever his connection with it, but hoped this severance would only be temporary.

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Conferment of London Degree.—The University of London has announced that the degree of Doctor of Philosophy in the Faculty of Science has been conferred on J. D. Biggers, B.SC., B.SC. (VET. SCI.), M.R.C.V.S., for a thesis entitled "Studies on the Intravaginal action of Natural Oestrogens." Mr. Biggers holds the post of Lecturer in Veterinary Physiology in the University of Sydney.

HARRY STEELE-BODGER MEMORIAL FUND

Third List of Donations

The Appeal Committee acknowledge with grateful thanks receipt of the following additional donations to this Fund:—

	£	s.	d.
Total announced on January 3rd	1,192	5	4
Mr. J. Adamson, Jun. (Bolton)	2	2	0
Mr. J. Adamson (Lea)	1	1	0
Mr. J. Anderson (Keith)	1	1	0
Miss M. Anderson (Sutton Coldfield)	1	1	0
Mr. G. F. Banham (Barford)	1	1	0
Messrs. Bayer Products, Ltd.	10	10	0
Mr. H. Begg (Strathaven)	2	2	0
Mr. L. W. Benwell (London)	2	2	0
Mr. P. S. Blackburn (Kirkhill)	3	3	0
Boots Pure Drug Co.	105	0	0
Mr. W. P. Brownie, Mr. H. Oxley (Walsall) ...	2	2	0
Mr. R. E. C. Bullen (Rottingdean)	2	2	0
Professor J. B. Buxton (Camden Town)	5	5	0
Mr. D. Campbell, Mr. S. M. C. Jones (Burton-on-Trent)	5	5	0
The Central Veterinary Society (1st instalment) ...	5	5	0
Mr. C. R. Coid (Compton)		10	6
Mr. C. F. Cooper (Croydon) (Veterinary Practitioner)	1	1	0
Miss Margaret Cooper (Bucksburn)	3	3	0
Mr. F. A. Davidson (Aberdeen)	2	2	0
Mr. W. A. Doughty (Alnwick)	2	2	0
Mr. G. Eaton (Market Harborough)	5	5	0
Dr. S. J. Edwards (Compton)	1	1	0
Mr. T. A. R. Filgate (Ardee)	1	0	0
Mr. T. B. Fleming (Dumfries)	2	2	0
Mr. A. V. B. Foster, Mr. E. J. Hughes (Solihull) ...	5	5	0
Mr. H. S. Gates, Mr. G. W. Serth (Purley)	10	10	0
Mr. and Mrs. R. H. Goodhand (Sutton Coldfield) ...	2	2	0
Mr. W. V. Gray (Storrington)	1	1	0
Mr. O. V. Gunning (Acle)	5	5	0
Mrs. E. Hall (Lichfield)		10	0
Mr. R. F. Hall (Edinburgh)	5	0	0
Mr. J. F. Harbourne (Manchester)	1	1	0
Dr. Tom Hare (Finchley)	3	3	0
Mr. A. S. Harris (Barnard Castle)	2	2	0
Mr. P. D. Harrison (Stow-on-the-Wold)	5	5	0
Mr. R. L. L. Hart (Yelverton)	1	1	0
Mr. T. Hay, Mr. J. R. Humphreys (Tutbury) ...	6	6	0
Mr. F. Haydon (Uckfield) (Farmer)	1	1	0
Mr. C. G. Hearn (Devon)	1	1	0
Mr. W. W. Henderson (Walhampton)	1	1	0
Miss Hodson (Lichfield)	1	1	0
Mr. J. E. Hood (Warton)	2	2	0
Mr. H. L. W. Hope (Neston)	1	1	0
Mr. F. Hopkin (Knutsford)	5	0	0
Mr. C. G. Hopson (Golders Green)	2	2	0
Mr. D. L. Hughes (Thurgarton)	1	1	0
Mr. J. H. M. Hughes (Cardiff)	1	1	0
Mr. and Mrs. J. McConnachie Ingram (Oxted) ...	25	0	0
Mr. T. H. Jones, Mr. F. V. John, Mr. H. A. Lamont, Mr. B. Lewis (Llandilo)	10	0	0
Mr. R. H. Lambert, Mr. N. H. Lambert (Dublin)	2	2	0
Major C. J. R. Lawrence (Wilmington)	1	1	0
Miss M. G. Leslie (Romford)	1	0	0
Mr. D. G. Llewellyn (Cardiff)	1	1	0
Mr. J. D. Loughran (Stockton-on-Tees)	1	1	0
Mr. C. McCarraher (Southampton) (Farmer) ...	1	1	0
Mr. W. A. Macgregor (Ayr)	2	2	0
Mr. F. M. McKenzie (Kilmarnock)	2	2	0
Mr. G. McWilliam (Portsmouth) (Farmer) ...	1	1	0
Messrs. Minsal, Ltd. (Northwich)	10	10	0
Dr. A. Moldawsky (Wedmore)	3	3	0
Mrs. Dora Motton (for the late Mr. Jack Motton) (Penzance)	10	10	0
Mr. A. Nisbet, Mr. G. M. Harries, Mr. J. I. Davies, Mr. W. G. D. Peters (Haverfordwest) ...	10	10	0
Major J. W. O'Kelly (Maynooth)	1	0	0
Mr. G. M. G. Oliver (Lanchester)	5	5	0
Mrs. I. Olver (Tamworth)	1	1	0
Mr. D. W. Owen, Mr. J. E. Tudor (Dolgelley) ...	2	2	0
Mr. E. W. B. Owen (Claybrooke Parva)	5	5	0
Mr. R. H. Owen (Sutton Coldfield)	3	3	0
Mr. D. O. Packer (Ystrad Mynach)	1	1	0
Miss E. R. Parker, Mr. H. J. D. Neil, Mr. B. C. M. Edmonds (Penzance)	3	3	0
Pharmaceutical Specialities (May and Baker) Ltd. Veterinary Division	10	10	0
Mr. R. L. Phillips (Loughborough)	2	2	0
Dr. N. T. M. Plum (Denmark)	5	5	0
Mr. A. Pottie (Faisley)	3	3	0
Mr. B. M. Powell (Newport Pagnell) (Veterinary Practitioner)	1	1	0
Mr. E. L. Price (Ellesmere)	1	1	0
Mr. J. Rankin (Compton)	1	0	0
Mr. T. J. Reynolds (Cirencester)	1	1	0
Mr. W. G. Robinson (Carlisle)	5	5	0
Mr. R. F. Ross (Glasgow)	1	1	0
Mr. W. T. Rowlands (Bryn Adda)	1	1	0
Mr. Z. B. Rutherford, Mr. R. G. Orton (Fordingbridge)	2	2	0
Mr. F. C. Scott (Aldeburgh)	2	2	0
Dr. K. Seidel (Denmark)	5	5	0
Messrs. Shipley and Son (Admaston) (Farmers) ...	2	2	0
Mr. L. S. Sim (Cumnock)	1	1	0
Mr. M. J. Sin (Stormont)	1	1	0
Captain G. Sleith (Ballsbridge)	1	0	0
Mr. W. H. Sloan (Balerno)	1	1	0
Mr. J. Small (Forfar)	1	1	0
Major D. M. Stewart (London)	1	1	0
Mr. I. D. Sturton (Spalding)		10	6
Sussex Veterinary Society	10	10	0
Mr. H. C. Swann, Mr. J. C. Barrowman (King's Lynn)	5	5	0
Mr. P. Thomas (Luddendenfoot)		10	0
Mr. J. C. Wilson (Haddington)	1	1	0
Mr. W. H. Wood (Sherwood)	1	1	0
Miss M. E. Yates (Liverpool)	1	1	0
Anonymous donations	1	10	0
Total	£1,600	14	4

In the list published on January 3rd, 1953, the item referring to Professor Scorgie's donation should have read: "Professor N. J. Scorgie (Camden Town) £5 5s." We much regret the error made in the list.

All donations should be sent to the Hon. Treasurer of the Appeal Committee: S. L. Hignett, Steele-Bodger Memorial Fund, British Veterinary Association, 36, Gordon Square, London, W.C.1, and cheques, postal orders, etc., should be made payable to the "Steele-Bodger Memorial Fund."

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Ayrshire.—Raithhill Farm, Coylton, Ayr (Jan. 5th).

Berks.—Bodings Farm, Holyport, Maidenhead (Jan. 3rd); Allotments, Norcot Road, Reading (Jan. 6th).

Cheshire.—Millbank Farm, Wettenhall, Winsford (Jan. 9th).

Cumberland.—Preston Hows Farm, Whitehaven (Jan. 5th).

Derbys.—Dishfields Farm, Sutton-on-the-Hill, Derby (Jan. 5th); Town End Farm, Flagg, Buxton (Jan. 9th).

Essex.—Beckney Farm, South Fambridge, Rochford (Jan. 6th); Ashen Hall, Ashen, Sudbury (Jan. 8th); Messrs. Fordson's Estates, Boreham, Chelmsford (Jan. 9th).

Fifeshire.—The Dales Farm. Inverkeithing, Fife (Jan. 9th).

Glos.—Ploddy House Farm, Newent; Hunting Butts, Prestbury, Cheltenham (Jan. 5th); Teddington Manor Farm, Teddington, Beckford, Tewkesbury (Jan. 8th); Lorridge Farm, Berkeley, Gloucester (Jan. 10th).

Hants.—Burley Manor Hotel, Burley, Ringwood (Jan. 2nd); Home Farm, Laverstoke, Whitchurch (Jan. 3rd); Higher Farm, Linwood, Ringwood; Hilly Farm, Burton Latimer, Kettering (Jan. 6th).

Herefords.—Poston Mill Farm, Peterchurch, Hereford (Jan. 6th).

Herts.—52, Bullen's Green Lane, Rolstock, Hatfield (Jan. 10th).

Hunts.—Grange Farm, Houghton St. Ives (Jan. 2nd).

Kent.—Coldharbour Park, Hildenborough, Tonbridge (Jan. 3rd); Barnet Farm. Gravel Road, Bromley (Jan. 6th).

Lancs.—Banks Yard, Downham, Clitheroe; Ingethorpe Grange Farm, Bisham, Blackpool (Jan. 2nd); Lower Croasdale, Tatham, Hornby, Lancaster (Jan. 5th); High House Farm, Winster, Windermere (Jan. 6th).

Leics.—Piggeries, Cambridge Road, Whetstone, Leicester; Pontylne Farm, Wanlip Road, Syston, Leicester (Jan. 6th).

Norfolk.—Brick Kiln Farm, Banningham, Norwich (Jan. 5th); Manor Farm, Moulton St. Mary; Red House Farm, Yaxham, Dereham (Jan. 8th).

Northumberland.—Westwood Farm, Wylam (Jan. 7th).
Oxon.—Home Farm, Grafton Road, Kelmscott, Lechlade (Jan. 1st); Signett Hill Farm, Burford; Meadow Farm, Buckland Road, Bampton (Jan. 6th).
Perths.—Welton Farm, Blairgowrie (Jan. 2nd).
Somerset.—Two Waters Farm, Broadway, Ilminster (Jan. 10th).
Staffs.—Callingwood Plain Farm, Needwood, Burton-on-Trent (Jan. 3rd); No. 4 Holding, Upper Woollaston, Church Eaton, Stafford (Jan. 6th).
Surrey.—Highway Farm, Cobham (Jan. 8th).
Sussex.—Oakleigh Lodge, Lewes Road, East Grinstead (Jan. 2nd); Lower Theobalds Farm, Sandy Cross, Heathfield (Jan. 3rd); Lyfords Farm, Milland, Liphook (Jan. 5th); Malthouse Farm, Crawley (Jan. 8th).
Worcs.—Barnes Hall, Worcester (Jan. 6th).
Yorks.—Church House Farm, Danby; Making Place Farm, Soyland, Ripponden, Halifax (Jan. 5th); Cathedral Hall Farm, Giggleswick, nr. Ingleton (Jan. 6th); White House, Arkendale, Knaresborough (Jan. 8th).

Foot-and-Mouth Disease:
Sussex.—Mock Beggar Farm, Playden, East Sussex (Jan. 11th).

Fowl Pest:
Cambs.—1, Primrose Hill, Doddington, March (Jan. 5th).
Essex.—Silverthorn, Newbridge Road, Tiptree (Jan. 7th); Pilgrims, Little Baddow, Chelmsford (Jan. 9th).
Hants.—The Tower, Longthorpe, Peterborough (Jan. 6th).
Herts.—152, St. George's Drive, Carpender Park, Watford (Jan. 5th).
Kent.—Deerleap, Knockholt Road, Halstead; 5, St. George's Square, Maidstone (Jan. 8th); Windswept Cottage, Priddledock, Westerham; Five Oaks, Radfall, Ryde, Chestfield, Whitstable (Jan. 10th).
Lancs.—Spring Allotments, Oswaldtwistle, Accrington; Palmers Avenue Yard, Blackpool; 8, Stoney Street, Burnley; Progeny Trials, Ltd., Goosnargh, Preston (Jan. 6th); Somerset House Cottage, Ribbleton, Preston; Bernard Dene, Hall Lane, Longton, Preston; Kingswood, Bilsborrow, Preston; Mill Head Poultry Farm, Orell Lane, Warton, Carnforth (Jan. 7th); Nook Farm, Bamber Bridge, Preston; Whitefield House Farm, Mayfield Avenue, Ingol, Preston; Spring Allotments, Oswaldtwistle, Accrington; Holmes Farm, Brindle, Chorley (Jan. 9th); Lower Crow Nest Farm, Milnrow, Rochdale (Jan. 10th).
Lincs.—Shepherds Lane, Helpringham, Sleaford (Jan. 2nd); 17, Roughton Towers, Woodhall Spa (Jan. 3rd); Holland Farm, Sutton St. James, Spalding (Jan. 4th); Rosedale, Rectory Road, Ruskington, Sleaford (Jan. 7th); The Bungalow, Hornbank, Holbeach; Thorpe Lane, Eagle, Lincoln (Jan. 11th).
London.—26, Ranulf Road, Hampstead, N.W.2; 62, Upper Richmond Road, Putney, S.W.
Middlesex.—Orchard House, 117, Sutton Lane, Hounslow (Jan. 3rd); 4, Fareham Road, Feltham (Jan. 6th); 217, London Road, Twickenham (Jan. 7th).
Norfolk.—Red House Farm, Yaxham, Dereham (Jan. 3rd); Booters Hall Farm, Cranworth, Shipdham, Thetford; The Jolly Sportsman, Old Buckenham, Attleborough (Jan. 5th); Green Lane Farm, Winfarthing, Diss (Jan. 6th); Holly House, Pentney, King's Lynn; Marham Lodge, Pentney, King's Lynn (Jan. 7th).
Notts.—Woodend Poultry Farm, Calverton, Nottingham (Jan. 9th).
Oxon.—Hawthorns, Alvescott Road, Black Bourton (Jan. 3rd); Glebe Farm, Black Bourton; Mangapapa Poultry Farm, Carterton; Beechcroft Poultry Farm, Carterton (Jan. 6th); Old Farm ,House, Black Bourton (Jan 9th).
Staffs.—175, Stone Road, Stafford (Jan. 3rd).
Surrey.—Ridge House, Broom Close, Esher; 99, Queen's Road, Richmond (Jan. 3rd); 47, Thurston Road, Wimbledon, S.W. (Jan. 9th); 62, King's Avenue, New Malden; 70, Dorset Road, Merton Park (Jan. 10th).
Yorks.—1, East View, Cragg Road, Mytholmroyd; Premises at back of High Street, Yeadon, Leeds (Jan. 7th); 172, Saville Road, Dewsbury (Jan. 8th); Scout Bottom Farm, Mytholmroyd (Jan. 10th).

Swine Fever:
Berks.—Cordwallis Street Allotments, Maidenhead (Jan. 5th); Blakes Oak, Lodge Hill, Abingdon (Jan. 8th).
Ches.—Dairy Farm, Edge, Malpas (Jan. 2nd).
Cornwall.—Treloweth Farm. Pool, Redruth (Jan. 6th); Tregatillian, St. Columb (Jan. 10th and 12th).
Essex.—3a, Cromwell Lane, Maldon (Jan. 2nd); Brick Kiln Farm, Great Totham, Maldon (Jan. 5th); The Marshes, Station Road, Wivenhoe, Colchester (Jan. 9th).
Kent.—Rising Sun Piggeries, Kingsdown, Sevenoaks (Jan. 7th).
Lincs.—Manor Farm, Fotherby, Louth (Jan. 2nd); Skinners Lane, South Ferriby Barton-on-Humber (Jan. 3rd); Park House Farm, Laceby, Grimsby (Jan. 8th).
Middlesex.—Pole Hill Farm, Hillingdon (Jan. 4th); Stanwell Farm, Stanwell (Jan. 9th).
Notts.—Bank House Piggeries, Market Place, Tuxford, Newark (Jan. 2nd).
Oxon.—Town Farm, Finmere, Buckingham (Jan. 3rd).
Salop.—The Hollies, Butlers Bank, Shawbury, Shrewsbury (Jan. 3rd); Frankton Hill, Whittington, Oswestry (Jan. 5th).
Suffolk.—Peyton House, Boxford, Colchester (Jan. 3rd); Park Farm, Assington, Colchester (Jan. 5th); School Buildings, Great Barton, Bury St. Edmunds (Jan. 6th); Sunnyside, Back Street, Lakenheath, Brandon; Brick Wall Farm, Bacton, Stowmarket; Dairy Farm, Bradfield St. George, Bury St. Edmunds (Jan. 7th).
Surrey.—Frosbury Farm, Gravettes Lane, Guildford (Jan. 12th).
Worcs.—Stanley Farm, Ipsley Hill, Redditch (Jan. 2nd); Edgeoak Nursery, Astwood, Redditch; Ipsley Mill Farm, Redditch (Jan. 8th).
Yorks.—25a, Carr House Road Allotments,, Chequer Avenue, Doncaster (Jan. 5th); Ledston Hall School, Allerton Bywater, Castleford (Jan. 6th); Hillcrest, Leven Road, Yarm-on-Tees (Jan. 8th); Ranmoor, Little Hemsworth, Hemsworth, Pontefract (Jan. 9th).

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ORNITHOSIS AMONGST POULTRY IN NORFOLK AND SURREY

Ban on Parrot Importation Re-imposed

In an announcement on Friday of last week, the Ministry of Agriculture stated that two isolated cases of ornithosis (as the disease is commonly termed in birds other than those of the parrot family) or psittacosis had been discovered amongst ducklings in Norfolk and Surrey. In order to prevent the spread of the disease, which may in some circumstances cause relatively high mortality among poultry, the Minister of Agriculture and Fisheries has made an Order under the Diseases of Animals Act (the Psittacosis or Ornithosis Order, 1953), empowering the Ministry to impose movement restrictions, to slaughter the affected and contact birds, and to require the disinfection of premises. To quote from the notice: "It is known that the virus which causes this disease is present among birds in this country but this is the first occasion on which it has been recovered from domestic poultry. There is no reason to suppose that numerous cases will be disclosed but it is necessary to ensure disposal of infected birds and their contacts, not only to prevent spread of infection among poultry but also because of the possibility that human beings in close contact with infected birds might become infected. Psittacosis in man usually arises from close contact with infected birds of the parrot family, but cases have been recorded in which the infection may have come from other types of birds. The measures now being taken in so far as they relate to humans are, therefore, purely precautionary.

"The symptoms of the disease as observed in the cases which have been encountered are very similar to those of the subacute type of fowl pest. Fowl pest is a disease which must be promptly reported to the police, and cases reported will, where necessary, be investigated for ornithosis also." (The symptoms of fowl pest are then cited, as given at page 849 of our issue of December 20th.) "It is very important that a poultry-keeper observing any of these symptoms should report immediately.

"As a precautionary measure against the introduction of psittacosis into this country the Minister is proposing to make a further order prohibiting the importation of birds of the parrot family. This prohibition is also necessary to prevent the introduction of fowl pest, since it was recently discovered that a consignment of these birds from abroad was infected with fowl pest and, indeed, conveyed infection to domestic poultry with which they came in contact."

Since parrots were allowed into this country again last year after a 21-year Ministry of Health restriction deaths of three people have been attributed to psittacosis. At a recent inquest on the manager of a Birmingham pet shop found to have died from it, the jury added riders recommending that all persons handling birds and animals should wear protective clothing. They said no bird of the parrot family should be sold to the public or allowed into the country unless guaranteed by an expert to be free from infection.

The Ministry of Health's ban, imposed in 1930, followed an epidemic which began in 1928 when a boy in the East End of London bought a parrot for his mother. Shortly after the whole family died. The disease was responsible for about 100 deaths in that period.

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Weekly Wisdom

Experience shows that there is an increasing tendency to overlook the findings of previous workers and hence to advance as original ideas principles which have already been established—R. E. Glover: "The Organisation of Research" (In Press).